Intern Summary

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Duration of collaboration with MDPI: March-July 2016
Internship/Thesis Research Title:
Integrating a mobile accessible electronic system into dockside monitoring: How can small-scale fisheries data collection programs transition from paper-based to digital data collection?

Introduction:
Lack of reliable, high quality fishing activity data has undermined efforts to monitor marine fisheries efficiently. One of the barriers to capturing high quality fisheries data include inefficient paper processes, where multi-stage processes of transcribing logbook sheets to computer databases cause quality of data to degrade and increase time-lags. A way to overcome this problem is through the use of digital data collection. This project aimed to understand how small-scale dockside fisheries monitoring programs can transition from paper-based to digital data collection using the mobile app Point 97 Dock.

Internship Objectives:
This thesis studied the potential of introducing digital data collection in two stages:
1) Market-testing to typify existing fisheries data collection processes, identify gaps this technology could fill, and identify potential adoption barriers to the implementation of this technology. Specific goals were to:

Goal 1: Typify existing fisheries data collection programs and identify current data collection processes.
Goal 2: Identify areas in need of improvement to locate gaps this technology could fill.
Goal 3: Identify and define potential obstacles and adoption barriers to implementation of this technology.

2) Field-testing by deploying Dock at two small-scale Indonesian tuna fishery dockside monitoring sites, and comparing its performance with current paper-based methods using predetermined metrics of success. Specific goals were to:

Goal 1: Conduct a baseline assessment to outline fisheries management goals and specific monitoring objectives, and to detail MDPI's current process for data entry, management and storage.

Goal 2: Compare current paper-based methods to Dock according to predetermined metrics of success.

Goal 3: Provide recommendations to MDPI regarding implementing an electronic dockside monitoring solution such as Dock.

Methods:

1) Market-testing Dock: Assessed market potential for Dock through online surveys and interviews with NGOs conducting fisheries data collection to gather information on current data collection process, and potential benefits and obstacles of transitioning to Dock.

2) Field-testing Dock: Baseline assessment to document current field data collection system performed by MDPI enumerators at two sites (Larantuka and Kupang, both in Nusa Tenggara Timur). This is followed by comparing the performance of paper-based data collection to mobile app according to the following metrics of success: timeliness and availability; data collection cost.

Results and discussion:

Market-testing

Most respondents reported 'sustainable resource management' as being the primary purpose of their fisheries data collection program, 'species type' as the most valuable type of data collected, and 'building local capacity' as the most significant concern in fisheries data collection. When using paper-based data collection methods, there is an average time-lag between data collection and data availability of use among the NGOs is 35 days, with a mean cost of $99,000 spent annually on fisheries data collection (Figure 1).

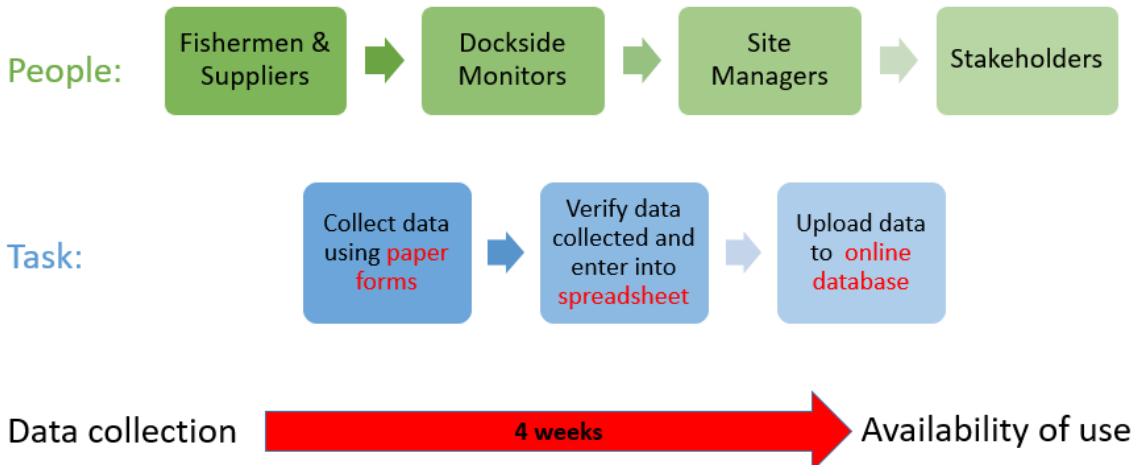

Fig. 1. MDPI's current system for data entry, processing, management and storage. Green boxes represent person by job title. Blue boxes represent task completed and the platform used.

Field-testing

When using the app, data collectors tend to lose time at the site in Larantuka (34% increase in time) and save time at the site in Kupang (53% decrease in time). The data entry, verify and data upload tasks were slower in Larantuka, whereas in Kupang all tasks were performed slightly faster when using the Dock app (Figure 2).This difference among sites was likely due to variations in patterns of catch landing, internet connectivity, and employee adoption rate. Total cost (including equipment and labor costs) was projected to increase by an average of 20% per field sampling site when using the app.

Cost-benefit analysis revealed high initial equipment costs would be balanced by a decrease in labor cost in the medium to long term (i.e. over a 5-year horizon, using the app at all field sites was projected to decrease overall cost of data collection by 8%). The choice between implementing the app and continuing to use paper depends on the willingness to wait for future returns.

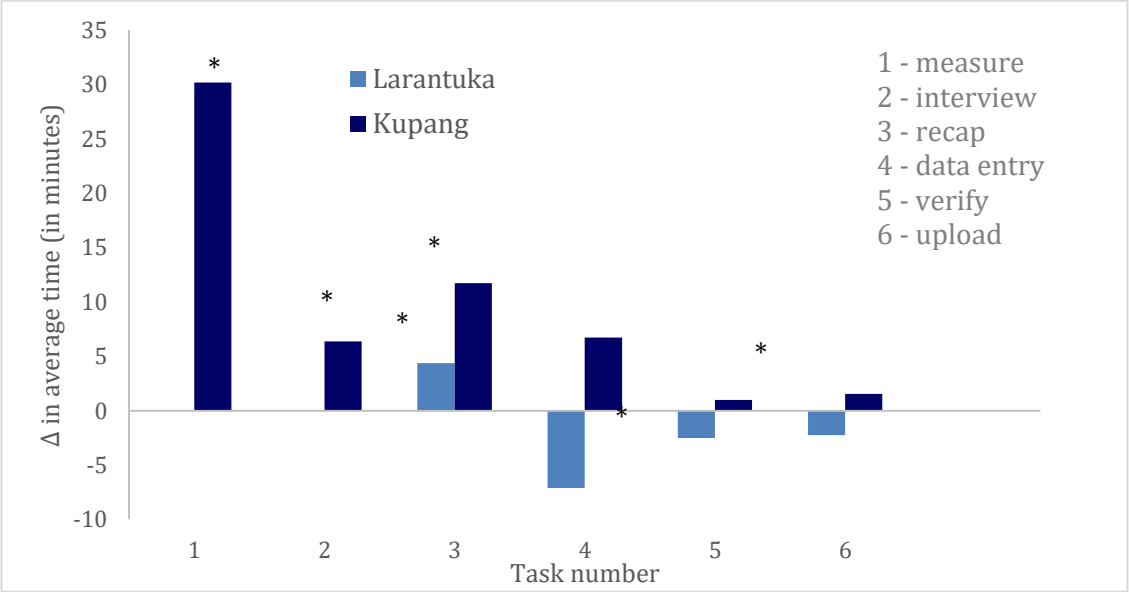

Fig. 2. Difference in average time required to complete individual task when using paper and mobile app. Positive values represent time saved using the app, negative values represent time lost using the app. Asterisks indicate significant differences.

Among NGOs, the importance of the time lag between data collection and availability of use as well as cost pales in comparison to other concerns such as building local capacity and incentivizing stakeholders to provide data. However, monitoring of fisheries catch data in near-real time would likely allow more flexibility to collaborate with fishermen in managing the fishery (e.g. allocating quotas, responding to in-season closures), thereby allowing organizations to better address concerns regarding incentivizing stakeholders and building local capacity. In addition, timely reporting of catch data could potentially reduce negative impacts to local stocks (e.g. stock overexploitation events), which could aid organizations in better achieving sustainable management of local resources.

Follow-up steps for MDPI:

1. Immediate implementation of Dock at the sites where there:
   - are more vessels are sampled,
   - are more enumerators on site,
   - is reliable internet connection and
   - are predictable vessel unloading events (i.e. Kupang, Lombok, North Buru and South Buru).

At other sites where enumerators actually lost time when using Dock, paper-based method should be prioritized as of now (i.e. Larantuka, Assilulu, Bitung, Bone, Pasar Wajo, Seram, Sorong, Tolitoli, Tulehu).

2. Conduct socialization process with local fishermen and suppliers to increase their acceptance of Dock, including explaining uses, expected benefits of Dock as well as the expected potential disruptions of work flow during vessel unloading events.

3. Conduct another cost-benefit analysis at the end of the first year of Dock implementation to determine if Dock should be implemented at other sites.

4. Sync Dock to I-Fish to allow interoperability of data platforms and further decrease in time-lag between data collection and availability to stakeholders.